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A Comparative Study and Analysis of Time-Series and Deep Learning Algorithms for Bitcoin Price Prediction

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Abstract

Background: Bitcoin [1] is the world's first and most popular cryptocurrency among all the cryptocurrencies. It has a current market capitalization of 1031.91 billion USD. Companies like Microstrategy, Tesla, Galaxy Digital Holdings, etc. are the major investors in Bitcoin. Bitcoin price is very volatile in nature. So, it is very challenging to accurately forecast the actual price of Bitcoin. For the last few years, several Bitcoin forecasting models have been developed by researchers across the globe, but they have produced average accuracy for Bitcoin price prediction. Some of the earlier works regarding the prediction of Bitcoin prices using the Time-Series and deep learning based Model are discussed here. "Bitcoin price prediction using ARIMA and LSTM" proposed by Yiqing Hua [2]. "BITCOIN PRICE PREDICTION USING LASSO ALGORITHM " proposed by Lekkala Sreekanth Reddy [3]. "Bitcoin price prediction using machine learning" proposed by Velankar [4].

Objective: To compare and analyze the Time-series ARIMA model, LASSO (least absolute shrinkage and selection operator) Regression model, deep neural network (DNN), short-term memory (LSTM), convolutional neural network (CNN), residual neural network (ResNet) and their combinations for Bitcoin price prediction. After analyzing all the existing models, propose a more accurate and reliable framework for Bitcoin price prediction considering all the parameters that can cause fluctuations in the Bitcoin price.

Methodology: Bitcoin dataset is collected from the Coinmarketcap (<https://coinmarketcap.com/>) for 12 months (October, 2020 to September, 2021). This dataset has been applied to the ARIMA, LASSO, DNN, CNN, LSTM, ResNet models for Predicting Bitcoin price. Orange Data mining tool has been used for analyzing the performance of all the existing models.

Result and discussion: After measuring the performance of the Time-Series ARIMA, LASSO, DNN, CNN, LSTM, ResNet models, it is found that the RMSE is less for LASSO and LSTM. So these two algorithms outperform the other algorithms for predicting the Bitcoin price. In the study, we found that an integrated LASSO and LSTM model has performed the most accurate prediction for Bitcoin price.

Future Work: Proposed integrated LASSO and LSTM model for Bitcoin prediction will perform better if different Government policies and sentiment analysis from the trader's comment is considered in it.

References

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